

INTERNATIONAL STANDARD

IEC
60335-2-36

Fifth edition
2002-10

Household and similar electrical appliances – Safety –

Part 2-36: Particular requirements for commercial electric cooking ranges, ovens, hobs and hob elements

*Appareils électrodomestiques et analogues –
Sécurité –*

*Partie 2-36:
Règles particulières pour les cuisinières, les fours,
les tables de cuisson et les foyers de cuisson
électriques à usage collectif*



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INTERNATIONAL ELECTROTECHNICAL COMMISSION

**HOUSEHOLD AND SIMILAR ELECTRICAL APPLIANCES –
SAFETY –****Part 2-36: Particular requirements for commercial electric
cooking ranges, ovens, hobs and hob elements**

FOREWORD

- 1) The IEC (International Electrotechnical Commission) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of the IEC is to promote international co-operation on all questions concerning standardization in the electrical and electronic fields. To this end and in addition to other activities, the IEC publishes International Standards. Their preparation is entrusted to technical committees; any IEC National Committee interested in the subject dealt with may participate in this preparatory work. International, governmental and non-governmental organizations liaising with the IEC also participate in this preparation. The IEC collaborates closely with the International Organization for Standardization (ISO) in accordance with conditions determined by agreement between the two organizations.
- 2) The formal decisions or agreements of the IEC on technical matters express, as nearly as possible, an international consensus of opinion on the relevant subjects since each technical committee has representation from all interested National Committees.
- 3) The documents produced have the form of recommendations for international use and are published in the form of standards, technical specifications, technical reports or guides and they are accepted by the National Committees in that sense.
- 4) In order to promote international unification, IEC National Committees undertake to apply IEC International Standards transparently to the maximum extent possible in their national and regional standards. Any divergence between the IEC Standard and the corresponding national or regional standard shall be clearly indicated in the latter.
- 5) The IEC provides no marking procedure to indicate its approval and cannot be rendered responsible for any equipment declared to be in conformity with one of its standards.
- 6) Attention is drawn to the possibility that some of the elements of this International Standard may be the subject of patent rights. The IEC shall not be held responsible for identifying any or all such patent rights.

This part of International Standard IEC 60335 has been prepared by IEC subcommittee 61E: Safety of electrical commercial catering equipment, of IEC technical committee 61: Safety of household and similar electrical appliances.

This fifth edition of IEC 60335-2-36 cancels and replaces the fourth edition published in 2000. It constitutes a technical revision.

The text of this part of 60335 is based on the following documents:

FDIS	Report on voting
61E/398/FDIS	61E/410/RVD

Full information on the voting for the approval of this standard can be found in the report on voting indicated in the above table.

This part 2 is to be used in conjunction with the latest edition of IEC 60335-1 and its amendments. It was established on the basis of the fourth edition (2001) of that standard.

NOTE 1 When "Part 1" is mentioned in this standard, it refers to IEC 60335-1.

This part 2 supplements or modifies the corresponding clauses in IEC 60335-1, so as to convert that publication into the IEC standard: Safety requirements for commercial electric cooking ranges, ovens, hobs and hob elements.

When a particular subclause of Part 1 is not mentioned in this part 2, that subclause applies as far as is reasonable. When this standard states "addition", "modification" or "replacement", the relevant text in Part 1 is to be adapted accordingly.

NOTE 2 The following numbering system is used:

- subclauses, tables and figures that are numbered starting from 101 are additional to those in Part 1;
- unless notes are in a new subclause or involve notes in Part 1, they are numbered starting from 101, including those in a replaced clause or subclause;
- additional annexes are lettered AA, BB, etc.

NOTE 3 The following print types are used:

- requirements: in roman type;
- *test specifications: in italic type;*
- notes: in small roman type.

Words in **bold** in the text are defined in Clause 3. When a definition of Part 1 concerns an adjective, the adjective and the associated noun are also in bold .

The committee has decided that the contents of this publication will remain unchanged until 2004. At this date, the publication will be

- reconfirmed;
- withdrawn;
- replaced by a revised edition, or
- amended.

The following differences exist in the countries indicated below.

- 6.1: Class 01 appliances are allowed if their rated voltage does not exceed 150 V (Japan).
- 6.2: For appliances intended to be installed in a kitchen, an appropriate degree of protection against harmful ingress of water is required according to their height of installation (France).
- 13.2: Leakage current limits are different (Japan).
- 16.2: Leakage current limits are different (Japan).
- Clause 21: For appliances intended to be installed in a kitchen, different values of impact energy are applicable according to the height of the impact point (France).

A bilingual version of this publication may be issued at a later date.

INTRODUCTION

It has been assumed in the drafting of this International Standard that the execution of its provisions is entrusted to appropriately qualified and experienced persons.

This standard recognizes the internationally accepted level of protection against hazards such as electrical, mechanical, thermal, fire and radiation of appliances when operated as in normal use taking into account the manufacturer's instructions. It also covers abnormal situations that can be expected in practice.

This standard takes into account the requirements of IEC 60364 as far as possible so that there is compatibility with the wiring rules when the appliance is connected to the supply mains. However, national wiring rules may differ.

If an appliance within the scope of this standard also incorporates functions that are covered by another part 2 of IEC 60335, the relevant part 2 is applied to each function separately, as far as is reasonable. If applicable, the influence of one function on the other is taken into account.

This standard is a product family standard dealing with the safety of appliances and takes precedence over horizontal and generic standards covering the same subject.

An appliance that complies with the text of this standard will not necessarily be considered to comply with the safety principles of the standard if, when examined and tested, it is found to have other features that impair the level of safety covered by these requirements.

An appliance employing materials or having forms of construction differing from those detailed in the requirements of this standard may be examined and tested according to the intent of the requirements and, if found to be substantially equivalent, may be considered to comply with the standard.

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HOUSEHOLD AND SIMILAR ELECTRICAL APPLIANCES – SAFETY –

Part 2-36: Particular requirements for commercial electric cooking ranges, ovens, hobs and hob elements

1 Scope

This clause of Part 1 is replaced by the following.

This International Standard deals with the safety of electrically operated commercial **cooking and baking ranges**, ovens, **hobs**, **hob elements** and similar appliances not intended for household use, their **rated voltage** being not more than 250 V for single-phase appliances connected between one phase and neutral and 480 V for other appliances.

NOTE 101 These appliances are used for example in restaurants, canteens, hospitals and commercial enterprises such as bakeries, butcheries, etc.

The electrical part of appliances making use of other forms of energy is also within the scope of this standard.

As far as is practicable, this standard deals with the common hazards presented by these types of appliances.

NOTE 102 Attention is drawn to the fact that

- For appliances intended to be used in vehicles or on board ships or aircraft, additional requirements may be necessary;
- In many countries additional requirements are specified by the national health authorities, the national authorities responsible for the protection of labour, the national water supply authorities and similar authorities.

NOTE 103 This standard does not apply to

- appliances designed exclusively for industrial purposes;
- appliances intended to be used in locations where special conditions prevail, such as the presence of a corrosive or explosive atmosphere (dust, vapour or gas);
- continuous process appliances for the mass production of food;
- steam cookers, forced and steam convection ovens (IEC 60335-2-42);
- hot cupboards (IEC 60335-2-49);
- microwave ovens (IEC 60335-2-90).

2 Normative references

This clause of Part 1 is applicable.

3 Definitions

This clause of Part 1 is applicable except as follows.

3.1.4 Addition:

NOTE 101 The **rated power input** is the sum of the power inputs of all the individual elements in the appliance that can be on at one time; where several such combinations are possible, that giving the highest power input is used in determining the **rated power input**.

3.1.9 Replacement:

normal operation

operation of the appliance under the following conditions

Solid **hob elements** are operated with no load and sheathed **hob elements** are operated with a load made of dull black, cold or hot rolled steel, 9 mm to 10 mm thick, that covers not less than 90 % and not more than 100 % of the element surface. The **hob elements** are operated with the controls set to give the temperatures as set out below, the temperature being measured at the geometrical centre or the hottest point of the solid element or load, if the element is unevenly heated.

Stepped controls are set to the first position that gives a temperature equal to or greater than 275 °C. Cycling controls are set so that the mean value of the temperature over the cycle is 275 °C ± 5 °C. If this temperature cannot be reached, the control is set at the maximum.

Non-induction heating sources beneath a glass-ceramic or similar material are operated with a pan or pans containing initially cold water, the pan(s) being filled to a height of 60 mm ± 10 mm. The pan or pans are of aluminium, of ordinary quality, not brightly polished, with a base concavity not exceeding 0,1 mm. The pan or pans shall cover the **cooking zone** to the greatest extent possible.

The pan or pans are covered with a lid. The controls are set at maximum until the water boils and then adjusted to maintain boiling. Water is added to maintain the water level during boiling.

Induction heating sources beneath a glass-ceramic or similar material are operated with the pan or pans recommended by the manufacturer.

If one pan is used, it shall cover as closely as possible, but not less than, the full area of the **cooking zone**. The pan is positioned centrally.

For non-circular **cooking zones** a combination of the smallest number of pans is chosen to cover as much as possible the area of the **cooking zone**.

The pan or pans in each case are filled with initially cold frying oil to a height of 30 mm ± 5 mm. The controls are set to maximum until the temperature of the oil attains a value of 180 °C and then adjusted to maintain the oil at a temperature of 180 °C ± 15 °C.

A further test is made using initially cold water, the pan(s) being filled to a height of 60 mm ± 10 mm. The pan or pans are covered with a lid. The controls are set at maximum until the water boils and then adjusted to maintain boiling. Water is added to maintain the water level during boiling.

The condition providing the most unfavourable results (oil or water) is used.

Ovens are operated with no load and with the controls set so that the mean value of the temperature over the thermostat cycle at the geometric centre of the usable space in the interior of the oven is maintained at 240 °C ± 4 °C. Stepped controls are set so that this temperature is 240 °C ± 15 °C. For ovens that are capable of attaining temperatures in excess of 290 °C, the controls are set so that the temperature is 50 °C ± 4 °C below the maximum temperature attainable. For ovens that are unable to attain a temperature of 240 °C, the controls are set to maximum.

Griddle plates are operated with no load and with the controls set so as to give the temperatures set out below, the temperature being measured at the hottest point of each controlled cooking surface. Stepped controls are set to the first position that gives a temperature equal to or greater than 275 °C. Cycling controls are set so that the mean value of the temperature over the cycle is 275 °C ± 5 °C. If this temperature cannot be reached, the control is set to maximum.

Motors incorporated in the appliance are operated in the intended manner under the most severe conditions that can be expected in normal use, taking into account the manufacturer's instructions.

3.101

cooking and baking range

a single cooking or baking appliance incorporating one or more ovens together with one or more **hob elements** or **griddle plates** or a combination of these

NOTE An appliance incorporating a forced convection oven, steam-convection oven or microwave oven is considered to be an appliance incorporating another appliance (see also 5.102).

3.102

heating unit

any part of the appliance that fulfils an independent cooking or heating function

NOTE 1 Examples are **hob elements**, **griddle plates** or ovens.

NOTE 2 If an oven incorporates more than one heating element or groups of elements that are so controlled that one element or group cannot be switched on while another element or group is energized, each of the elements or groups of elements is to be considered as a separate **heating unit** and tested accordingly.

3.103

hob element

boiling plate

surface element

heating unit designed to accommodate a vessel or vessels on its upper surface

NOTE A **hob element** may consist of an **induction** or non-induction **heating source** beneath a surface of glass-ceramic or similar material.

3.104

hob surface

cooking top

horizontal part of the appliance to which the **hob elements** are attached

3.105

hob

a **hob surface** and one or more **hob elements**. It may be a separate appliance or part of a **cooking range**

NOTE A **hob** may also incorporate a **griddle plate**.

3.106

cooking zone

area marked on a **hob surface** of glass-ceramic or similar material where the vessel is intended to be placed

3.107

induction heating source

a heating source that operates by inducing eddy currents in a vessel positioned on the **hob element**

3.108

griddle plate

a **heating unit** having a cooking surface on which the food is intended to be placed directly

3.109

installation wall

a special fixed construction containing supply facilities for appliances installed in conjunction with it

3.110

pan detector

a device incorporated in a **hob element** that prevents its operation unless a vessel is placed on the **cooking zone**

NOTE A **pan detector** is not considered to be a **thermostat** or **protective device**.

4 General requirement

This clause of Part 1 is applicable.

5 General conditions for the tests

This clause of Part 1 is applicable except as follows.

5.2 Addition:

Hob elements that are submitted separately are tested when installed in an appropriate **cooking range**.

The test of 18.2 may be made on a separate sample.

5.3 Addition:

The test of 18.2 is made before the test of Clause 11 unless it is made on a separate sample.

5.10 Addition:

*Appliances intended for installation in a bank of other appliances and appliances intended to be fixed to an **installation wall** are enclosed to obtain protection against electric shock and harmful ingress of water equivalent to that obtained when installed in accordance with the instructions provided with the appliances.*

NOTE 101 Appropriate enclosures or additional appliances may be needed for test purposes.

5.101 *Appliances are tested as **heating appliances**, even if they incorporate a motor.*

5.102 *Appliances, when assembled in combination with or incorporating other appliances, are tested in accordance with the requirements of this standard. The other appliances are operated simultaneously in accordance with the requirements of the relevant standards.*

6 Classification

This clause of Part 1 is applicable except as follows.

6.1 Replacement:

Appliances shall be **class I** with respect to protection against electric shock.

Compliance is checked by inspection and by the relevant tests.

7 Marking and instructions

This clause of Part 1 is applicable except as follows.

7.1 Addition:

In addition, appliances shall be marked with

- the water pressure or range of pressures, in kilopascals (kPa), for appliances intended to be connected to a water supply, unless this is indicated in the instruction sheet.

Appliances incorporating **induction heating sources** shall in addition be marked with

- operating frequency or operating frequency range in kilohertz (kHz);
- the total power input of all the induction **heating unit(s)** that can operate simultaneously, in watts or kilowatts, unless this is indicated in the instruction sheet;

NOTE 101 The power input to be marked or declared is the highest power input any switching arrangement will allow.

- the total power input of all the non-induction **heating unit(s)** that can operate simultaneously in watts or kilowatts unless this is indicated in the instruction sheet.

NOTE 102 The power input to be marked or declared is the highest power input any switching arrangement will allow.

Any cover giving access to **live parts** at a **working voltage** exceeding 250 V shall be marked by the following:

WARNING – DANGEROUS VOLTAGE or by the symbol for dangerous voltage (see 7.6).

Covers giving access to induction coils shall be marked by the following:

CAUTION – MAGNETIC FIELD or by the symbol for non-ionizing electromagnetic radiation (see 7.6).

NOTE 103 If it is not possible to mark these warnings on the cover, they may be placed close to the cover-retaining screws.

7.6 Addition:

	[symbol 5140 of IEC 60417-1]	non-ionizing electromagnetic radiation
	[symbol 5036 of IEC 60417-1]	dangerous voltage
	[symbol 5021 of IEC 60417-1]	equipotentiality

7.12 Addition:

If the appliance incorporates a **hob surface** of glass-ceramic or similar material that provides the enclosure of **live parts**, the instructions shall include the substance of the following warning:

WARNING: If the surface is cracked, immediately disconnect the appliance or appropriate part of the appliance from the supply.

The instructions for appliances with **hob surfaces** of glass-ceramic or similar material shall state that aluminium foil and plastic vessels are not to be placed on the hot surfaces. They shall also state that these surfaces are not to be used for storage.

The instructions for **hobs** incorporating halogen lamps shall warn the user to avoid looking directly at the lamps when on.

The instructions for appliances incorporating **induction heating sources** shall indicate the size of the smallest cooking vessel to be used. They shall also include the substance of the following:

- metallic objects such as kitchen utensils, cutlery etc. shall not be placed on the **hob surface** within the **cooking zones** since they could get hot;
- take care when operating the appliance, as rings, watches and similar objects worn by the user could get hot when in close proximity to the **hob surface**;
- only use vessels of the type and size recommended.

The instructions for appliances incorporating **induction heating sources** shall state that users with heart pacemakers should consult with the manufacturer, unless specific details are given.

The instructions for **hobs** with **hob elements** incorporating **pan detectors** shall include the substance of the following:

After use, switch the **hob element** off by means of its control. Do not rely on the **pan detector**.

If symbol 5021, 5036 or 5140 of IEC 60417-1 is marked on the appliance, its meaning shall be explained.

7.12.1 Replacement:

The appliance shall be accompanied by instructions detailing any special precautions necessary for installation. For appliances intended for installation in a bank of other appliances and appliances intended to be fixed to an **installation wall**, details of how to ensure appropriate protection against electric shock and harmful ingress of water shall be supplied. If the controls of more than one appliance are combined in a separate enclosure, detailed installation instructions shall be supplied. Instructions for **user maintenance**, for example cleaning, shall also be given. They shall include a statement that the appliance is not to be cleaned with a water jet.

For appliances that are permanently connected to fixed wiring and for which leakage currents may exceed 10 mA, particularly if disconnected or not used for long periods, or during initial installation, the instruction sheet shall give recommendations regarding the rating of **protective devices**, such as earth leakage relays, to be installed.

In addition, for appliances incorporating **induction heating sources**, the instructions shall state that any repairs shall be carried out only by persons trained or recommended by the manufacturer.

Compliance is checked by inspection.

7.12.4 Addition:

For appliances incorporating **induction heating sources**, a warning that care be taken to ensure that the splashback and surrounding area are free of metallic surfaces, if this is necessary due to the design of the appliance. The instructions for **built-in appliances** having a separate control panel for several appliances shall state that the control panel is only to be connected to the specified appliances in order to avoid a possible hazard.

7.15 Addition:

When it is not practical to place the marking of **fixed appliances** so that it is visible after the appliance has been installed, the relevant information shall also be included in the instructions for use or on an additional label that can be fixed near the appliance after installation.

NOTE 101 An example of such an appliance is a **built-in hob**.

7.101 If, during the test of Clause 11, the temperature rise of the side and rear walls of the test corner above the level of the hob surface exceeds 65 K, and/or during the test of Clause 19 the temperature rise of the walls above and below the hob surface exceeds 125 K, the installation instructions provided by the manufacturer shall include the substance of the following that shall also be included on a non-permanent label, for example a tie-on type, attached to the appliance:

Where this appliance is to be positioned in close proximity to a wall, partitions, kitchen furniture, decorative finishes, etc., it is recommended that they be made of non-combustible material, or if not, that they shall be clad with a suitable non-combustible heat-insulating material, and that the closest attention be paid to fire prevention regulations.

Compliance is checked by inspection.

7.102 The **cooking zones** of **hob surfaces** of glass-ceramic or similar material shall be clearly identified by appropriate marking, unless they are obvious.

Compliance is checked by inspection.

7.103 Equipotential bonding terminals shall be marked with symbol 5021 of IEC 60417-1.

These markings shall not be placed on screws, removable washers or other parts that can be removed when conductors are being connected.

Compliance is checked by inspection.

8 Protection against access to live parts

This clause of Part 1 is applicable except as follows.

8.1 Addition:

Appliances intended to accommodate detachable **hob elements** shall be constructed so that there is adequate protection against accidental contact with **live parts** during insertion or removal of these elements.

8.101 Heating elements that are liable to be touched accidentally by a fork or similar pointed object in normal use, shall be so protected that it is not possible to touch their **live parts** with such an object.

*Compliance is checked by inserting test probe 12 of IEC 61032 at all points where the probe can enter in the vicinity of **live parts**. The probe is applied without appreciable force.*

9 Starting of motor-operated appliances

This clause of Part 1 is applicable except as follows.

9.101 Fan motors providing a cooling effect in order to comply with the requirements of Clause 11 shall start under all voltage conditions that may occur in use.

*Compliance is checked by starting the motor three times at a voltage equal to 0,85 times **rated voltage**, the motor being at room temperature at the beginning of the test.*

*The motor is started each time under the conditions occurring at the beginning of **normal operation** or, for automatic appliances, at the beginning of the normal cycle of operation, the motor being allowed to come to rest between successive starts. For appliances provided with motors having other than centrifugal starting switches, this test is repeated at a voltage equal to 1,06 times **rated voltage**.*

In all cases, the motor shall start and it shall function in such a way that safety is not affected and overload **protection devices** of the motor shall not operate.

NOTE The supply source must be such that during the test the drop in voltage does not exceed 1 %.

10 Power input and current

This clause of Part 1 is applicable except as follows.

10.1 Modification:

Instead of the first paragraph of the requirement, the following applies.

The power input of appliances without **induction heating sources**, at **rated voltage** and at normal operating temperature, shall not deviate from the **rated power input** by more than the deviation shown in Table 1.

The power input of appliances having only **induction heating sources**, at **rated voltage** and at normal operating temperature, shall not deviate from the **rated power input** by more than 10 %.

The measurement is made before the controls are adjusted to the reduced setting.

For appliances incorporating **induction** and non-induction **heating sources** the following applies.

The power input of the **induction heating sources** and the non-induction heating sources is measured separately, in each case using a combination of **heating units** that can be on at the same time to give the highest power input. For the **induction heating sources**, the measurement is made before the controls are adjusted to the reduced setting.

The power inputs so measured shall in the case of the **induction heating sources** not deviate from the power input marked or declared by the manufacturer (see 7.1) by more than 10 %, and in the case of the non-induction heating sources not deviate from the power input marked or declared by the manufacturer (see 7.1) by more than that given in Table 1 for **heating appliances**.

In addition, the power input of the appliance when the **induction** and non-induction **heating sources** are operated simultaneously shall not deviate from the **rated power input** by more than 10 %.

Addition:

NOTE 101 For appliances having more than one **heating unit**, the total power input may be determined by measuring the power input of each **heating unit** separately (see also 3.1.4).

11 Heating

This clause of Part 1 is applicable except as follows.

11.2 Addition:

Appliances intended to be fixed to the floor and appliances with a mass greater than 40 kg and not provided with rollers, castors or similar means are installed in accordance with the manufacturer's instructions. If no instructions are given, these appliances are considered as appliances normally placed on the floor.

11.3 Addition:

NOTE 101 If the measurements can be unduly influenced by emissions from an **induction heating source**, i.e. the magnetic field, this must be taken into account.

In general, the use of thermocouples is not recommended because of the expected faulty heating-up of the thermocouples caused by the **induction heating source**. For example, the temperature rise of the **induction heating source** can be determined by using a platinum resistance, preferably of high resistance, with twisted connecting wires. The platinum resistances are placed on the hottest point of the winding so as to influence as little as possible the temperature to be measured.

11.4 Replacement:

*The non-induction **heating units** of the appliance are operated under **normal operation** at 1,15 times the power input marked or declared (see 7.1).*

*If the temperature rise limits of motors, transformers or **electronic circuits** are exceeded, the test is repeated with the appliance supplied at 1,06 times **rated voltage**. In this case, only the temperature rises of motors, transformers and **electronic circuits** are measured.*

*Induction **heating units** are operated simultaneously and supplied separately at the most unfavourable voltage between 0,94 times minimum **rated voltage** and 1,06 times maximum **rated voltage**.*

*If it is not possible to switch on all heating elements or **induction heating sources** at the same time, the test is made with each of the combinations that the switch arrangement will allow, the highest load possible with each switching arrangement being in circuit.*

*If the appliance is provided with a control that limits the total power input, the test is made with whichever combination of **heating units**, as may be selected by the control, imposes the severest condition.*

*In addition, appliances incorporating **induction heating sources** are also operated as above, but with the smallest size of pan as recommended by the manufacturer placed in the most onerous position consistent with being able to energize the coil, but within the **cooking zone**.*

NOTE 101 The additional operating condition described above is not applied when reference to Clause 11 is made in other tests.

11.7 Replacement:

Appliances are operated until steady conditions are established.

NOTE 101 The duration of the test may consist of more than one cycle of operation.

11.8 Addition:

The limit of 65 K temperature rise for the rear and side test walls, including the part of the test corner that projects in front of the appliance, only applies below the level of the **hob surface**. If this temperature rise limit is exceeded above the **hob surface** then the requirements of 7.101 apply.

12 Void

13 Leakage current and electric strength at operating temperature

This clause of Part 1 is applicable except as follows.

13.1 Modification:

Instead of the first four paragraphs of the test specification the following applies.

Compliance is checked by the tests of 13.2 and 13.3, which are made after the appliance has been operated under the conditions specified in Clause 11. The appliance is operated until the leakage current has reached a steady value or for the time specified in 11.7, whichever is the shorter period.

If more than one pan is placed on a single **cooking zone**, they are electrically connected together.

13.2 Modification:

Instead of the permissible leakage current for **stationary class I appliances**, the following applies:

- for cord and plug connected appliances 1 mA per kW **rated power input** of the appliance with a maximum of 10 mA
- for other appliances 1 mA per kW **rated power input** of the appliance with no maximum

13.3 Addition:

If there is earthed metal between **live parts** and the surface of glass-ceramic or similar material, all the pans on the **hob surface** are electrically connected together and to earthed metal.

A test voltage of 1 000 V is then applied between **live parts** and the pans.

If there is no earthed metal between **live parts** and the surface of glass-ceramic or similar material, all the pans on the **hob surface** are electrically connected together, but not connected to earthed metal.

A test voltage of 3 000 V is then applied between **live parts** and the pans.

NOTE 101 Care is taken to ensure that the voltage applied does not overstress the other insulations.

14 Transient overvoltages

This clause of Part 1 is applicable.

15 Moisture resistance

This clause of Part 1 is applicable except as follows.

15.1.1 Addition:

In addition, IPX0, IPX1, IPX2, IPX3 and IPX4 appliances are subjected for 5 min to the following splash test.

The apparatus shown in Figure 101 is used. During the test, the water pressure is so regulated that the water splashes up 150 mm above the bottom of the bowl. The bowl is placed on the floor for appliances normally used on the floor. For all other appliances on a horizontal support 50 mm below the lowest edge of the appliance, the bowl is moved around in such a way as to splash the appliance from all directions. Care is taken that the appliance is not hit by the direct jet.

15.1.2 Modification:

Appliances normally used on a table are placed on a support having dimensions that are 15 cm ± 5 cm in excess of those of the orthogonal projection of the appliance on the support.

Addition:

*If detailed instructions regarding the cleaning of movable but **non-detachable** (for example hinged) **hob elements** are given in the instruction sheet, tests on these **hob elements** are carried out with the elements in the horizontal position of normal use.*

15.2 Replacement:

Appliances shall be constructed so that spillage of liquid in normal use does not affect their electrical insulation.

Compliance is checked by the following test.

Appliances with **type X attachment**, except those having a specially prepared cord, are fitted with the lightest permissible type of flexible cable or cord of the smallest cross-sectional area specified in 26.6 and other appliances are tested as delivered.

Detachable parts are removed.

Appliances are positioned so that the **hob surface** is horizontal and if the **hob elements** are adjustable separately, their surfaces are also horizontal.

A vessel having a diameter equal to or not more than 25 mm smaller than the largest inscribed circle on the **hob element** or **cooking zone** is completely filled with cold salt water and placed in the most unfavourable position, not overlapping the **hob element** or the **cooking zone**.

A further quantity of cold salt water equal to approximately 2 l is poured steadily into the vessel over a period of 1 min.

NOTE 101 The test is made on each **hob element** separately, the tray or other receptacle being emptied each time.

For appliances incorporating ovens or grills, the spillage test is made by pouring steadily over a period of 1 min approximately 1 l of cold salt water over the bottom surface of the oven or grilling compartment.

For appliances incorporating **griddle plates**, approximately 1 l of cold salt water is poured steadily over a period of 1 min onto the centre of the surface of the **griddle plate**.

If controls are mounted in the **hob surface** of the appliance, 1 l of cold salt water is poured steadily over a period of 1 min over the controls.

NOTE 102 The salt water solution contains approximately 1 % NaCl.

Immediately after this treatment, the appliance shall withstand an electric strength test as specified in 16.3 and inspection shall show that water that may have entered the appliance does not impair compliance with this standard, in particular, there shall be no trace of water on insulation for which **clearances** and **creepage distances** are specified in Clause 29.

15.3 Addition:

NOTE 101 If it is not possible to place the whole appliance in the humidity cabinet, parts containing electrical components are tested separately, taking into account the conditions that occur in the appliance.

15.101 Appliances that are provided with a tap intended for filling or cleaning, shall be constructed so that the water from the tap cannot come into contact with **live parts**.

Compliance is checked by the following test.

The tap is fully opened for 1 min with the appliance connected to a water supply having the maximum water pressure indicated by the manufacturer. Tiltable and movable parts, including lids, are tilted or placed in the most unfavourable positions. Swivelling outlets of water taps are positioned so as to direct water onto those parts that will give the most unfavourable result. Immediately following this treatment the appliance shall withstand an electric strength test as specified in 16.3.

16 Leakage current and electric strength

This clause of Part 1 is applicable except as follows.

16.1 Addition:

For appliances provided with **hob surfaces** of glass-ceramic or similar material, the tests of 16.2 and 16.3 are made with a pan or pans as described in 3.2.9.

If more than one pan is placed on a single **cooking zone**, they are electrically connected together.

16.2 Modification:

Instead of the permissible leakage current for **stationary class I appliances**, the following applies:

- for cord and plug connected appliances 1 mA per kW **rated power input** of the appliance with a maximum of 10 mA
- for other appliances 1 mA per kW **rated power input** of the appliance with no maximum

Addition:

If there is earthed metal between **live parts** and the surface of glass-ceramic or similar material, the leakage current is measured for each of the **cooking zones** in turn, only the pan(s) concerned being connected to earthed metal.

The leakage current shall not exceed 1 mA per kW of the power input of the **heating unit** being tested.

If there is no earthed metal between **live parts** and the surface of glass-ceramic or similar material, the leakage current is measured between **live parts** and the pan(s) for each of the **cooking zones** in turn, the pan(s) concerned not being connected to earthed metal.

In addition, the leakage current is measured between **live parts** and a probe consisting of a flat metal disc 50 mm in diameter. The probe is placed in all positions on the **hob surface** outside the **cooking zones**, the pans remaining in position.

For each measurement the leakage current shall not exceed 0,25 mA.

16.3 Addition:

If there is earthed metal between **live parts** and the surface of glass-ceramic or similar material, all the pans on the **hob surface** are electrically connected together and to the earthed metal.

A test voltage of 1 250 V is then applied between **live parts** and the pans.

If there is no earthed metal between **live parts** and the surface of glass-ceramic or similar material, all the pans on the **hob surface** are electrically connected together, but not connected to earthed metal.

A test voltage of 3 000 V is then applied between **live parts** and the pans.

17 Overload protection of transformers and associated circuits

This clause of Part 1 is applicable.

18 Endurance

This clause of Part 1 is applicable except as follows.

18.101 Appliances incorporating **induction heating sources** shall be constructed so that, in normal use, there is no failure that impairs compliance with this standard. The insulation shall not be damaged and connections shall not work loose.

Compliance is checked by energizing each **induction heating source** 100 000 times by moving the smallest pan recommended by the manufacturer (or an equivalent metallic object) on and off the **hob element** at a rate of six times per minute (5 s for each movement). The test is made at the least favourable voltage as determined in Clause 11.

18.102 Appliances incorporating surfaces of glass-ceramic or similar material shall withstand thermal stresses liable to occur in normal use.

Compliance is checked by the following test:

The appliance is operated with all heating sources beneath the glass-ceramic or similar material energized at the same time. Non-induction heating sources are operated with a pan filled with water according to 3.2.9 but placed in the most unfavourable position on the **cooking zone**. **Induction heating sources** are operated with an empty pan.

The controls are set at maximum and the appliance is operated for 500 cycles, each cycle comprising 10 min on and 20 min off, the supply being 1,1 times **rated voltage**. The operation of **thermostats** or **temperature limiters** during the test is ignored.

Immediately after the last energized period the pan(s) is (are) removed and the hob surface is subjected to a spillage test using $2^{+0,1}_0$ l of cold water between 10 °C and 15 °C, poured steadily over the surface for 1 min.

Fifteen minutes later all excess water is removed from the surface.

After the test the surface shall not be cracked or broken and the appliance shall withstand the test in 16.3.

19 Abnormal operation

This clause of Part 1 is applicable except as follows.

19.1 Modification:

Instead of the first paragraph of the test specification, the following applies.

All appliances are subjected to the tests of 19.2 and 19.3.

In addition, appliances provided with a control limiting the temperature during the tests of Clause 11 are subjected to the test of 19.4 and, where applicable, to the test of 19.5. However, for these tests, **hob elements with induction heating sources** are not energized and appliances incorporating only **induction heating sources** are not tested.

Appliances incorporating **PTC heating elements** are also subjected to the test of 19.6.

19.2 Addition:

Induction heating sources beneath a surface of glass-ceramic or similar material are operated with an empty pan placed in the least favourable position consistent with being able to energize the coil, even if not within the **cooking zone**. The **induction heating sources** are supplied with a voltage of 0,94 times the **rated voltage**.

Non-induction heating sources beneath a surface of glass-ceramic or similar material are operated without a pan or with an empty pan, whichever is the least favourable condition.

For all **heating units** the controls are adjusted to the highest setting.

Pan detectors are rendered inoperative.

19.3 Modification:

Induction heating sources are supplied with a voltage of 1,06 times the **rated voltage**.

If more than one **hob element** with a non-induction heating source is incorporated in an appliance, the supply voltage is that required to provide a power input of 1,15 times the **rated power input** under **normal operation**.

19.4 Addition:

NOTE 101 The main contacts of the contactor intended for switching on and off the heating element(s) in normal use are locked in the "ON" position. However, if two contactors operate independently of each other or if one contactor operates two independent sets of main contacts, these contacts are locked in the "ON" position in turn.

19.12 Addition:

The test is also repeated if, for any of the fault conditions specified in 19.101, the safety of the appliance depends on the operation of a miniature fuse-link complying with IEC 60127.

19.13 Addition:

*If the temperature rise of the walls above and below the **hob surface** exceeds 125 K, the requirements of 7.101 apply.*

The temperature of the windings of induction coils shall not exceed the values shown in Table 8 of 19.7.

19.101 Appliances incorporating **induction heating sources** shall be constructed so that the risk of fire, mechanical hazard or electric shock is obviated as far as is practicable in the event of incorrect operation or the development of defects in control devices or circuit components.

*Compliance is checked by applying any form of operation or any defect in the relevant circuits that may be expected in normal use while the appliance is operated under conditions of **normal operation at rated voltage** or at the upper limit of the **rated voltage range**. Only one fault condition is reproduced at a time, the tests being made consecutively.*

NOTE Examples of fault conditions are:

- drop-out of contactors and of electromagnetic components;
- failure of motors to start;
- drop in voltage supply, re-appearance of the voltage, voltage interruptions of up to 0,5 s;
- fault conditions specified in 19.11 as applicable.

Examination of the appliance and its circuit diagrams will generally show the fault conditions to be simulated.

20 Stability and mechanical hazards

This clause of Part 1 is applicable except as follows.

20.101 Appliances other than appliances intended to be fixed to the floor shall have adequate stability when the doors are open and subjected to a load.

Compliance is checked by the following tests.

Doors having a horizontal hinge at their lower edge are opened and a weight is gently placed on the surface of the door so that its centre of gravity is vertically over the geometric centre of the door. The contact area of the weight is such as will cause no damage to the door, and its mass is

- for appliances normally used on a floor:
 - for oven doors: 23 kg or such higher value as, according to the manufacturer's cooking instructions, can be placed in the oven;
 - for other doors: 7 kg;
- for appliances normally used on a table or similar support and provided with doors having a horizontal hinge at their lower edge and a projection of at least 225 mm from the hinge to the opening edge:
 - 7 kg or such higher value as, according to the manufacturer's cooking instructions, can be placed in the oven.

*Doors, except those where the lower level of the oven is above a **hob**, having a vertical hinge are opened through an angle of 90°, and a downward force of 140 N is then applied gently to the top of the door at the extremity furthest from the hinge.*

This test is repeated with the door opened as far as possible, but not through an angle of more than 180°.

During these tests, the appliance shall not tilt.

NOTE For the weight, a sandbag may be used.

For appliances provided with more than one door, the tests are made on each door separately.

For non-rectangular doors, the force is applied to that point furthest from the hinge where such a force might be exerted in normal use.

Damage to, and deformation of, doors and hinges are neglected.

21 Mechanical strength

This clause of Part 1 is applicable except as follows.

21.101 Shelves shall be constructed so that they do not fall away from the shelf supports either when inside the oven or extended out by 50 % of their depth. They shall not tip when extended out by 50 %.

Compliance is checked by the following test.

Load a cake tin or similar container, having an area of 75 % of that of the shelf, with evenly distributed weights of mass totalled 40 kg for each square meter of tin area. Insert a shelf, with the loaded tin centrally disposed, on the supports provided in the oven. Move the shelf as far as possible to the left, leave for 1 min and then withdraw it. Re-insert the shelf and move it to the extreme right, leave it for 1 min and again withdraw it.

During this test the shelf shall not fall away from the support.

The test is then repeated with the shelf extended out by 50 % of its depth. Then apply an additional force of 10 N vertically downward on the centre of the exposed front edge of the shelf. During this test the shelf shall not tip.

NOTE A small angle of deflection is allowed.

21.102 Hob surfaces of glass-ceramic or similar material shall withstand the stresses liable to occur in normal use.

Compliance is checked by the following test.

*Heating sources beneath a surface of glass-ceramic or similar material are operated in accordance with the conditions of Clause 11 until steady conditions are established. After switching off, the **hob surface** is immediately subjected to the following test:*

A vessel having a copper or aluminium base that is flat over a diameter of 220 mm ± 10 mm with edges rounded with a radius of at least 10 mm is uniformly filled with sand or shot so that the total mass is 4 kg. The vessel is dropped flat from a height of 150 mm onto the surface.

*The test is carried out 10 times on any part of the **hob surface** but not within 20 mm of control knobs.*

The heating sources are then again operated in accordance with the conditions of Clause 11 until steady conditions are established.

Immediately after switching off, a quantity of $2^{+0,1}_0$ l of cold water at $15\text{ °C} \pm 5\text{ °C}$ is then poured steadily over a period of 1 min over the surface; 15 min later all excess water is removed. The appliance is then allowed to cool to approximately ambient temperature. An additional quantity of $2^{+0,1}_0$ l of cold water is then again poured steadily over a period of 1 min over the surface.

Fifteen minutes later all excess water is removed and the surface wiped dry.

After the tests the surface shall not be cracked or broken and the appliance shall withstand the test of 16.3.

22 Construction

This clause of Part 1 is applicable except as follows.

22.101 Thermal cut-outs protecting circuits with heating elements and those for motors of which the unexpected starting may cause a hazard shall be of the non-self-resetting, trip-free type and shall provide **all-pole disconnection** from the supply. If the **non-self-resetting thermal cut-out** is only accessible after removing parts with the aid of a tool, the trip-free type is not required.

NOTE **Thermal cut-outs** of the trip-free type have an automatic action, with a reset actuating member, so constructed that the automatic action is independent of manipulation or position of the reset mechanism.

Compliance is checked by inspection and by manual test.

22.102 Lights, switches or push-buttons shall only be coloured red for the indication of danger, alarm or similar situations.

Compliance is checked by inspection.

22.103 Hinged lids shall be protected against accidental falling.

Compliance is checked by inspection and manual test.

22.104 Detachable hob elements and their supports shall be constructed so that the **hob elements** are prevented from rotating about a vertical axis and are adequately supported in all possible positions of adjustment of the supports.

Hinged **hob elements** shall be protected against accidental dropping.

*Compliance is checked by applying a force of 20 N in the least favourable position and direction to the raised **hob element**. The **hob element** shall not rotate or fall back to its operating position.*

NOTE Hinged **hob elements** that can be opened through an angle of at least 100° , even if placed against a wall, are not subjected to this test.

22.105 Induction heating sources shall have adequate visual or audible warning that the control is in the "ON" position.

Compliance is checked by inspection.

NOTE The position of a control knob does not, in itself, constitute an adequate warning.

22.106 Appliances incorporating **induction heating sources** shall be constructed so that the power input of these sources is limited to a value of 120 % of the marked or declared power input.

Compliance is checked by inspection and measurement.

22.107 **Portable appliances** shall not have openings on the underside that would allow small items to penetrate and touch **live parts**.

*Compliance is checked by inspection and by measuring the distance between the supporting surface and **live parts** through openings. This distance shall be at least 6 mm. However, if the appliance is fitted with legs, this distance is increased to 10 mm if the appliance is intended to stand on the table and to 20 mm if it is intended to stand on the floor.*

22.108 **Hob elements** with **induction heating sources** shall be constructed so that the **hob element** does not operate when only a small metal object is placed on the **cooking zone**.

Compliance is checked by the following test.

*A disc of low carbon sheet steel 1,5 mm thick and having a diameter of 50 mm is placed flat in the most unfavourable position on the **cooking zone**. The controls are at their highest setting.*

The disc shall not be heated.

NOTE A temperature rise not exceeding 35 K is ignored.

22.109 In appliances incorporating a **pan detector**, a signal lamp shall indicate when the control for the **hob element** is not switched to the **off position**.

Compliance is checked by inspection.

23 Internal wiring

This clause of Part 1 is applicable except as follows.

23.3 Addition:

*When the capillary tube of the **thermostat** is liable to flexing in normal use the following applies:*

- where the capillary tube is fitted as part of the internal wiring, Part 1 applies;*
- where the capillary tube is separate, it is subjected to 1 000 flexings at a rate not exceeding 30 per min.*

NOTE 101 If, in any of the above cases, it is not possible to move the movable part of the appliance at the given rate, due for example to the mass of the part, the rate of flexing may be reduced.

After the test, the capillary tube shall show no sign of damage within the meaning of this standard and no damage impairing its further use.

However, if a rupture of the capillary tube renders the appliance inoperative (fail-safe), separate capillary tubes are not tested, and those fitted as part of the internal wiring are not inspected for compliance with the requirements.

Compliance in this instance is checked by rupturing the capillary tube.

NOTE 102 Care must be taken to ensure that the rupture does not seal the capillary tube.

24 Components

This clause of Part 1 is applicable except as follows.

24.1.4 Modification:

- *energy regulators*
 - *for automatic action* 100 000
 - *for manual action* 10 000
- **self-resetting thermal cut-outs**
 - *for radiant heating elements of glass-ceramic hobs* 100 000
 - *for other heating elements* 10 000

25 Supply connection and external flexible cords

This clause of Part 1 is applicable except as follows.

25.1 Addition :

Appliances shall not be provided with an appliance inlet.

25.3 Addition:

Fixed appliances and appliances with a mass greater than 40 kg and not provided with rollers, castors or similar means shall be constructed so that the **supply cord** can be connected after the appliance has been installed in accordance with the manufacturer's instructions.

Terminals for permanent connection of cables to fixed wiring may also be suitable for the **type X attachment** of a **supply cord**. In this case, a cord anchorage complying with 25.16 shall be fitted to the appliance.

If the appliance is provided with a set of terminals allowing the connection of a flexible cord, they shall be suitable for the **type X attachment** of the cord.

In both cases the instructions shall give full particulars of the power **supply cord**.

The connection to the supply wires of **hobs**, **built-in cooking ranges** and **built-in ovens** may be made before the appliance is installed.

Compliance is checked by inspection.

25.7 Modification:

Instead of the types of **supply cords** specified, the following applies:

Supply cords shall be oil-resistant, sheathed flexible cable not lighter than ordinary polychloroprene or other equivalent synthetic elastomer-sheathed cord (code designation 60245 IEC 57).

26 Terminals for external conductors

This clause of Part 1 is applicable.

27 Provision for earthing

This clause of Part 1 is applicable except as follows.

27.2 Addition:

Stationary appliances shall be provided with a terminal for the connection of an external equipotential conductor. This terminal shall be in effective electrical contact with all fixed exposed metal parts of the appliance, and shall allow the connection of a conductor having a nominal cross-sectional area of up to 10 mm². It shall be located in a position convenient for the connection of the bonding conductor after installation of the appliance.

NOTE 101 Small fixed exposed metal parts, for example nameplates and the like, are not required to be in electrical contact with the terminal.

28 Screws and connections

This clause of Part 1 is applicable.

29 Clearances, creepage distances and solid insulation

This clause of Part 1 is applicable except as follows.

29.2 Addition:

The microenvironment is pollution degree 3 and the insulation shall have a comparative tracking index (CTI) not less than 250, unless the insulation is enclosed or located so that it is unlikely to be exposed to pollution during normal use of the appliance.

30 Resistance to heat and fire

This clause of Part 1 is applicable except as follows.

30.2.1 Modification:

The glow-wire test is carried out at 650 °C.

30.2.2 Not applicable

30.101 Filters, if any, of non-metallic materials intended for the absorption of grease are subjected to the burning test specified in ISO 9772 for category HBF material, if relevant, or shall be classified at least HB40 according to IEC 60695-11-10, except that the thickness of the specimen is the same as that in the appliance.

NOTE It may be necessary to support the specimen.